CLAIMS

What is claimed:

1. A carrier for a semiconductor substrate, comprising:

a support structure on an active surface of a semiconductor substrate and positioned adjacent to an outer peripheral edge of the semiconductor substrate, each semiconductor device fabricated upon the active surface being located within an outer periphery of the support structure.

2. The carrier of claim 1, wherein the support structure comprises a support ring.

3. The carrier of claim 2, wherein each semiconductor device is located within and exposed through an inner periphery of the support ring.

4. The carrier of claim 1, wherein the support structure comprises at least one of a photoimageable polymer and a thermoset polymer.

5. The carrier of claim 4, wherein the support structure further comprises at least one filler dispersed throughout the photoimageable polymer.

6. The carrier of claim 5, wherein the filler comprises at least one of silica particles, alumina particles, nitride particles, and polymer particles or fibers.

7. The carrier of claim 5, wherein the filler has a lower coefficient of thermal expansion than another material of the support structure.

8. The carrier of claim 1, wherein an entirety of the support structure is located completely on the active surface.

9. The carrier of claim 8, wherein an outer peripheral edge of the support structure is in substantial alignment with the outer peripheral edge of the semiconductor substrate.

10. The carrier of claim 1, wherein an outer peripheral portion of the support structure extends laterally beyond the outer peripheral edge of the semiconductor substrate.

11. The carrier of claim 10, wherein the outer peripheral portion of the support structure includes a downwardly extending portion located laterally adjacent to the outer peripheral edge of the semiconductor substrate.

12. The carrier of claim 11, wherein the downwardly extending portion is spaced apart from the outer peripheral edge.

13. The carrier of claim 12, further comprising:

a retention ledge extending inwardly from the downwardly extending portion to as to overlap at least a portion of a peripheral portion of a back side of the semiconductor substrate.

14. The carrier of claim 10, wherein the outer peripheral portion includes at least one of a marking, a locating feature, and a fixturing feature.

15. The carrier of claim 11, wherein at least the outer peripheral portion of the support structure comprises a plurality of at least partially superimposed, contiguous, mutually adhered layers.

16. The carrier of claim 1, wherein the support structure substantially covers the active surface, portions of the support structure located over semiconductor devices

that have been fabricated on the active surface comprising package elements for each of the semiconductor devices.

17. A method for thinning a semiconductor substrate, comprising:
forming a support structure on an active surface of the semiconductor substrate;
removing material from a back side of the semiconductor substrate to form a thinned semiconductor substrate; and
transporting the thinned semiconductor substrate for further processing.

18. The method of claim 1, wherein forming the support structure comprises forming a support ring on the active surface adjacent to an outer peripheral edge of the semiconductor substrate.

19. The method of claim 18, wherein forming the support ring comprises forming the support ring such that each semiconductor device that has been fabricated on the active surface is located within an inner periphery of the support ring and is exposed therethrough.

20. The method of claim 17, wherein forming the support structure includes forming a layer of packaging material over the active surface and extending radially outward to at least an outer peripheral edge of the semiconductor substrate.

21. The method of claim 17, wherein forming the support structure comprises forming the support structure to include an outer peripheral portion that extends beyond the outer peripheral edge of the semiconductor substrate.

22. The method of claim 21, wherein forming the support structure further comprises forming the outer peripheral portion to include a downwardly extending portion located laterally adjacent to the outer peripheral edge of the semiconductor substrate.

23. The method of claim 17, wherein forming the support structure comprises:
forming a layer comprising unconsolidated material over at least an outer peripheral portion of the active surface; and
at least partially consolidating the unconsolidated material within at least outer peripheral regions of the layer.

24. The method of claim 23, wherein at least partially consolidated the unconsolidated material comprises directing a focused energy beam onto at least the outer peripheral regions of the layer.

25. The method of claim 24, wherein directing the focused energy beam comprises directing a laser beam onto at least the outer peripheral regions of the layer.

26. The method of claim 17, wherein forming the support structure comprises stereolithographically forming the support structure.

27. The method of claim 17, wherein forming the support structure comprises:
positioning a preformed film of support material over the active surface; and
removing selected regions of the preformed film.

28. The method of claim 17, wherein forming the support structure comprises molding the support structure on the active surface.

29. The method of claim 17, further comprising:
securing the semiconductor substrate to a support with the active surface facing the support and the support structure abutting at least one surface or feature of the support.

30. The method of claim 29, wherein securing the semiconductor substrate comprises applying a negative pressure to the active surface.

31. The method of claim 29, wherein securing the semiconductor substrate includes sealing the support structure against the at least one surface or feature.

32. The method of claim 17, wherein removing material from the back side of the semiconductor substrate comprises at least one of chemically and mechanically removing material from the back side.

33. The method of claim 17, wherein removing material from the back side of the semiconductor substrate comprises back grinding.

34. The method of claim 17, wherein the support structure supports the thinned semiconductor substrate during transporting thereof.

35. A semiconductor substrate of reduced thickness, comprising:
an active surface;
a back side opposite the active surface;
an outer peripheral edge defining an outer boundary of the active surface and the back side; and
a support structure on the active surface and extending substantially to all areas of the outer peripheral edge.

36. The semiconductor substrate of claim 35, wherein the support structure comprises a support ring located over only an outer peripheral portion of the active surface, an interior area of the active surface being exposed through the support ring.

37. The semiconductor substrate of claim 35, wherein the support structure substantially covers the active surface.

38. The semiconductor substrate of claim 35, further comprising:
a plurality of semiconductor devices fabricated on the active surface.

39. The semiconductor substrate of claim 38, wherein the support structure comprises a support ring located over only an outer peripheral portion of the active surface, semiconductor devices of the plurality of semiconductor devices being exposed through the support ring.

40. The semiconductor substrate of claim 35, wherein the support structure substantially covers the active surface.

41. The semiconductor substrate of claim 40, wherein portions of the support structure that are located over semiconductor devices comprise package elements for the semiconductor devices adjacent thereto.

42. The semiconductor substrate of claim 41, wherein at least some bond pads of the fully semiconductor devices are exposed through the protective structures.

43. The semiconductor substrate of claim 35, wherein the support structure comprises a photoimageable polymer.

44. The semiconductor substrate of claim 43, wherein the support structure further comprises a filler dispersed throughout the photoimageable polymer.

45. The semiconductor substrate of claim 35, wherein the support structure comprises a thermoset material.

46. The semiconductor substrate of claim 45, wherein the support structure further comprises a filler dispersed throughout the thermoset material.

47. The semiconductor substrate of claim 35, wherein an outer peripheral edge of the support structure is in substantial alignment with the outer peripheral edge of the semiconductor substrate.

48. The semiconductor substrate of claim 35, wherein an outer peripheral portion of the support structure extends laterally beyond the outer peripheral edge of the semiconductor substrate.

49. The semiconductor substrate of claim 48, wherein the outer peripheral portion of the support structure includes a downwardly extending portion located laterally adjacent to the outer peripheral edge of the semiconductor substrate.

50. The semiconductor substrate of claim 49, wherein at least the outer peripheral portion of the support structure comprises a plurality of at least partially superimposed, contiguous, mutually adhered layers.

51. A material for use in stereolithographic processes, comprising:
a photoimageable polymer; and
a filler material in the photoimageable polymer.

52. The material of claim 51, wherein the photoimageable polymer is configured to at least partially consolidate upon exposure thereof to ultraviolet radiation.

53. The material of claim 51, wherein the filler material comprises a particulate filler material.

54. The material of claim 53, wherein the particulate filler material comprises at least one of a silica, an alumina, a nitride, and a polymer.

55. The material of claim 51, wherein the filler material comprises a fibrous filler material.

56. The material of claim 55, wherein the fibrous filler material comprises a polymer.

57. The material of claim 55, wherein the fibrous filler material comprises KEVLAR.

58. The material of claim 51, wherein the filler material has a lower coefficient of thermal expansion than the photoimageable polymer.

59. The material of claim 51, wherein the filler material enhances a strength of a structure formed upon at least partially consolidation of the photoimageable polymer.

60. The material of claim 51, wherein the filler comprises up to about 50%, by weight, thereof.

61. A method for optimizing a physical property of a structure formed with a photoimageable polymer, comprising mixing a filler material the physical property into the photoimageable polymer prior to at least partial consolidation of the photoimageable polymer.

62. The method of claim 61, wherein mixing the filler material comprises mixing a filler material with a lower coefficient of thermal expansion than that of the photoimageable polymer into the photoimageable polymer.

63. The method of claim 61, wherein mixing the filler material comprises mixing a filler material with a greater rigidity than that of the photoimageable polymer into the photoimageable polymer.

64. The method of claim 61, wherein mixing the filler material comprises mixing a filler material with a greater fracture toughness than that of the photoimageable polymer into the photoimageable polymer.

65. The method of claim 61, wherein mixing the filler material comprises mixing a filler material with a greater thermal stability than that of the photoimageable polymer into the photoimageable polymer.

66. The method of claim 61, wherein mixing the filler material comprises mixing a filler material comprising at least one of particles and fibers into the photoimageable polymer.

67. The method of claim 61, wherein mixing the filler material comprises mixing a filler material comprising at least one of a silica, an alumina, a nitride, and a polymer into the photoimageable polymer.

68. The method of claim 61, wherein mixing the filler material comprises mixing a filler material comprising KEVLAR into the photoimageable polymer.

69. The method of claim 61, wherein mixing the filler material comprises forming a mixture that includes including up to about 50%, by weight, of the filler material.